

# Matera CGS VLBI Analysis Center

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**Abstract** This paper reports the VLBI data analysis activities at the Space Geodesy Center (CGS) of the Italian Space Agency (ASI) in Matera, performed from January 2021 through December 2022, and the contributions that the CGS intends to provide in the future as an IVS Analysis Center.

## 1 General Information

The CGS VLBI Analysis Center is located at the Matera VLBI station, close to the town of Matera in the middle of Italy. The Matera VLBI station became operational at the ASI/CGS in May 1990. Since then, it has been active in the framework of the most important international programs. The CGS, operated by E-GEOS S.p.A. (an ASI/Telespazio company) under an ASI contract, provides full scientific and operational support using the main space geodetic techniques: VLBI, SLR, and GPS. The work presented in this report is carried out by the E-GEOS staff consisting of Roberto Lanotte and Simona Di Tomaso.

## 2 Activities during the Past Two Years

During 2021–2022, the following activities were performed at CGS:

1. E-GEOS S.p.A., Centro di Geodesia Spaziale
2. Italian Space Agency, Centro di Geodesia Spaziale

CGS Analysis Center

IVS 2021+2022 Biennial Report

- **Global VLBI Solutions asi2021a and asi2022a.** We continued the annual realization of global VLBI solutions. The solutions are named asi2021a and asi2022a and were realized using the CALC/SOLVE software developed at NASA/GSFC. The main and final characteristics of them are:

### *asi2021a:*

- Data span: 1984.01.04–2020.12.29 for a total of 5,113 sessions.
- Estimated Parameters:
  - Celestial Frame: Right ascension and declination as global parameters for 4,791 sources and as local parameters for 435 sources;
  - Terrestrial Frame: Coordinates and velocities for 72 stations as global parameters and coordinates as local parameters for 51 stations;
  - Earth Orientation: X pole, Y pole, UT1, Xp rate, Yp rate, UT1 rate, dX and dY for each session.

### *asi2022a:*

- Data span: 1984.01.04–2021.12.29 for a total of 5,301 sessions.
- Estimated Parameters:
  - Celestial Frame: Right ascension and declination as global parameters for 4,791 sources and as local parameters for 536 sources;
  - Terrestrial Frame: Coordinates and velocities for 72 stations as global parameters and coordinates as local parameters for 50 stations;

- Earth Orientation: X pole, Y pole, UT1, Xp rate, Yp rate, UT1 rate, dX and dY for each session.
- **IVS Tropospheric Products.** Regular submission of tropospheric parameters (wet and total zenith path delays, east and north horizontal gradients) for all VLBI stations observing in the IVS R1 and R4 sessions continued during 2021–2022. Currently, 2,182 sessions have been analyzed and submitted, covering the period from 2002 to 2022. The results are available at the IVS data centers.
- **Daily Solution Files (DSNX).** Regular submission of daily sinex files for the IVS project “Daily EOP + station-coordinates solutions” continued during 2021–2022. All sessions lasting at least 18 hours were analyzed and at the present about 6,450 sessions were submitted to IVS.
- **Software development.** We continued the development of the software “*resolve*.” The main purpose of this software is the visual editing of a VLBI database. One of the reasons that led us to develop this software was to have the capability to work on the output obtained from a run of SOLVE in BATCH mode. We now have used *resolve* to edit approximately 100% of the databases of the daily sinex production.

### 3 Staff at CGS Contributing to the IVS Analysis Center

- Dr. Giuseppe Bianco, responsible for CGS/ASI (primary scientific/technical contact).
- Dr. Rosa Pacione, responsible for scientific activities, E-GEOS.
- Dr. Roberto Lanotte, geodynamics data analyst, E-GEOS.
- Dr. Simona Di Tomaso, geodynamics data analyst, E-GEOS.

### 4 Future Plans

- Continue and improve the realization of our global VLBI solution, providing its regular update on time.
- Continue to participate in the IVS analysis projects.